# Overeducation and Job Satisfaction: the Role of Job Demands and Control[1]

**Dieter Verhaest**[2], **Elsy Verhofstadt**[3]

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*Abstract*

We investigate how job demands and control contribute to the relationship between overeducation and job satisfaction, relying on panel data for Belgian young workers. Our results reveal a significant role of demands and control. At career start, overeducated workers have less control than adequately educated individuals with similar skills levels, but more control than adequately educated employees doing similar work. Moreover, their control increases faster over the career than that of both groups of adequately educated workers. Finally, demands have less adverse effects on satisfaction for high-skilled workers, irrespective of their match, while control moderates the negative satisfaction effect of overeducation. These results contribute to a better understanding why overeducation persists. Moreover, they are consistent with the hypothesis that employers hire overeducated workers because they require less monitoring and are more able to cope with demands, although more direct evidence on this is needed.

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[2] KU Leuven, Faculty of Economics and Business, Campus Brussel; KU Leuven, Leuven Economics of Education Research (LEER); Ghent University, SHERPPA; Dieter.Verhaest@kuleuven.be.

[3] Ghent University, Faculty of Economics and Business Administration; Study Hive for Economic Research and Public Policy Analysis (SHERPPA); Elsy.Verhofstadt@UGent.be.

## 1. Introduction

Studies for many countries indicate that a substantial part of workers are overeducated, i.e. they are employed in jobs with requirements below their educational level (Groot and Maassen van den Brink, 2000a). The relevance of this issue is illustrated by research showing that overeducated individuals earn less and are less satisfied with their job than adequately educated workers with a similar educational background (Hartog, 2000; Allen and Van der Velden, 2001). Moreover, overeducation can be a persistent problem for many individuals (Baert *et al.*, 2013). These findings raise the question why job seekers accept and, in particular, stay in overeducation positions. Further, given the observed negative relationship between job satisfaction and turnover (Freeman, 1978) or productivity (Iaffaldano and Muchinsky, 1985), we may wonder why employers are prepared to hire overeducated workers and what the most efficient HR strategies are to counter these adverse effects.

A straightforward answer to the question why workers accept and stay overeducated, are the existence of labour market imbalances in combination with labour market rigidities[1]. However, a basic level of overeducation is always observed across countries (Groot and Maassen van den Brink, 2000a), indicating that this is only part of the story. Another explanation, advanced by McGuinness and Sloane (2011), is based on a 'compensating differentials'-argument. Could it be that some workers stay in jobs for which they are overeducated because these jobs have other good characteristics? Given the negative relationship between overeducation and job satisfaction, this explanation seems rather farfetched. Yet, there is also evidence that the job satisfaction penalty of overeducation diminishes with years of work experience (Verhaest and Omey, 2009). One possible explanation is an increase in job quality over time, reducing one's inclination to change jobs and making overeducation more persistent.

While job quality can be measured in many ways (Muñoz de Bustillo *et al.*, 2009), we focus on job demands and control. The Job Demand-Control (JDC) model (Karasek, 1979) is one of the most dominant and influential paradigms on job quality in labour psychology (Wang *et al.*, 2014) and has gained influence within other disciplines such as economics (Green, 2006). According to this model, high job demands in combination with low decision latitude causes strain. Hence, if overeducation is associated with lower job demands and increasing control over one's career, some might prefer to stay in these jobs rather than engaging in continued time-intensive job search. Since arguments can be advanced both pro and con the statement

that overeducation is associated with more control and less demands (see section 3), an empirical test is needed.

Job demands and control may also explain why employers are prepared to hire overeducated workers. As stated by van der Meer and Wielers (1996), overeducated workers may require less supervision and monitoring. Besides, we will hypothesise in this paper that they are more able to cope with work and time pressure. The JDC model also delivers a framework to employers to enhance the well-being of their workers. Other studies showed that the well-being consequences of overeducation cannot be compensated by a reasonable wage increase (Verhaest and Omey, 2009). More efficient might be to compensate overeducated workers with more control. This may be in particular a successful strategy if control not only has an independent effect on job satisfaction, but also moderates the negative impact of over-education. That this is not unlikely is illustrated by Weststar (2009), who found that control has a negative influence on perceived overqualification. Similarly, Erdogan and Bauer (2009) found that empowerment moderates the negative effects of perceived overqualification on job satisfaction, intentions to remain and voluntary turnover.

In this paper, we make a more explicit link between overeducation and the JDC model. In a first step, we investigate whether and how overeducation affects the level of demands and control workers experience in their jobs. Next, we examine to what extent these differences in demands and control affect their job satisfaction. Although the consideration of some of these issues is not new, evidence remains scant, is mostly indirect and typically focusses on just one of the JDC dimensions. Our analysis also differs in several other ways from studies that focussed on related issues. Firstly, by relying on data for Flemish young workers, we focus at the first years of the career, when fundamental career choices are made and career processes are not yet influenced by unobserved preceding career decisions and events. Secondly, the longitudinal character of the data allows investigating whether and how the results change over time. This may shed some light on the mechanisms behind the persistence of overeducation. Thirdly, we execute panel-data analyses to account for unobserved individual heterogeneity. As Ferrer-i-Carbonell and Frijters (2004) showed in the context of happiness research, not accounting for this heterogeneity may substantially bias the results. Also for our research, this may be important since, as extensively argued in the literature (McGuinness, 2006), overeducated workers are likely to differ with respect to innate ability or preferences from adequately educated workers[2]. Fourthly, overeducated workers are compared with two

types of adequately educated workers: those with a similar educational background but employed at a higher job level (for simplicity named "their adequately educated former classmates" hereafter) and those employed in similar jobs but with a lower level of education ( "their adequately educated colleagues"). From the employee's perspective, particularly the first comparison is relevant as it assesses the consequences to accept a job below one's level of education instead of one that matches the educational level. From the employer's perspective, it is more relevant to know how overeducated workers differ from their adequately educated colleagues.

The paper is structured as follows. First, we review the literature on overeducation and its consequences. Next, we focus on the JDC model and elaborate our hypotheses. Thereafter, we explain our methods and review our estimation results. We end with a discussion and conclude.

## 2. Overeducation and its consequences

A substantial amount of literature regarding overeducation (McGuinness, 2006) or related concepts such as overqualification or underemployment (Feldman and Turnley, 1995) exists. Many of these studies estimate the effects of overeducation on outcomes such as wages, job satisfaction or turnover, using a regression related to the following specification:

$$(1)\ Y = \alpha YEDUC + \beta YREQ + \gamma YOVER + \delta YUNDER + \mathbf{X\theta} + \varepsilon$$

With $Y$ = an outcome, *YEDUC* = years of education, *YREQ* = years of required education, *YOVER* = years of overeducation, *YUNDER* = years of undereducation, **X** = a vector of control variables, and $\varepsilon$ = error term. Given that $YEDUC \equiv YREQ - YOVER + YUNDER$, equation (1) is not identifiable and therefore often reduced to:

$$(2)\ Y = (\beta + \alpha)YREQ + (\gamma + \alpha)YOVER + (\delta - \alpha)YUNDER + \mathbf{X\theta} + \varepsilon$$

If $Y$ = *ln (wage)*, studies typically find a positive return to *YOVER* ($\gamma + \alpha > 0$) and *YREQ* ($\beta + \alpha > 0$), and a negative return to *YUNDER* ($\delta - \alpha < 0$) (Hartog, 2000). Moreover, both the return to overeducation and the penalty to undereducation are found to be lower than the return to required education.

The evaluation of the extent to which overeducation has positive or negative wage effects

largely depends upon the comparison made. Compared with their adequately educated colleagues (cf. equation (2)), overeducated workers are better off as they earn a return on their surplus years of education. However, they earn less than their adequately educated former classmates as the return to these surplus years is lower than the return to required years of education ($\gamma < \beta$). This last comparison can be illustrated by substituting *YREQ* instead of *YEDUC* into equation (1):

$$(3)\ Y = (\alpha + \beta)YEDUC + (\gamma - \beta)YOVER + (\delta + \beta)YUNDER + \mathbf{X\theta} + \varepsilon$$

Equations (2) and (3) are equivalent and only differ with respect to the interpretation of the coefficients for over- and undereducation. Essentially, equation (2) measures the effects of mismatches resulting from a change in *YEDUC*, whereas equation (3) measures the effect of mismatches resulting from a change in *YREQ*. Equation (2) is particularly relevant for employers as it assesses how much more overeducated workers are paid compared to adequately educated one's doing the same type of job. Equation (3) is more informative for the worker as it assesses how much less they will be paid if they accept an overeducation position instead of one for which they would be adequately educated.

Also regarding other outcomes such as job satisfaction or turnover, overeducated workers can be compared with these two types of adequately educated workers. As equation (2) makes clear, differences in well-being between overeducated workers and their adequately educated colleagues might emerge from two factors. First, there might be a pure mismatch effect ($\gamma$), resulting from skill underutilization or feelings of relative deprivation. Second, there might be a supplementary effect ($\alpha$) resulting from the fact that overeducated workers have, by definition, more education than their adequately educated colleagues. This supplementary effect will show up if there is a relationship between years of education and the outcome variable regardless of the match. Consider for instance that highly educated individuals have, on average, higher aspirations about all aspects of their jobs. To the extent that aspirations are not directly observed, education might serve as a reliable signal. Hence, from the perspective of the employer who has to decide on the hiring of an overeducated worker, this is an additional effect to be taken into account. Also differences in outcomes between overeducated workers and their adequately educated former classmates might emerge from both a direct mismatch effect and a supplementary effect (cf. Equation (3)). Here, the supplementary effect ($\beta$) results from the fact that overeducated workers are, by definition, employed at lower job levels.

With respect to job satisfaction, cross-sectional studies generally find that overeducated workers are less satisfied with their job than their adequately educated former classmates (Feldman and Turnley, 1995; Battu *et al*., 2000; Allen and van der Velden, 2001; McGuinness and Sloane, 2011). When comparing them with their adequately educated colleagues, there is less consensus. While Hersch (1991) and Korpi and Tåhlin (2009) noted that overeducated workers are also less satisfied in comparison with this alternative group of adequately educated workers, other studies did find no or mixed evidence for this comparison (King and Hautaluoma, 1987; Khan and Morrow, 1991; Tsang *et al.*, 1991; Büchel, 2002). Further, Johnson and Johnson (2000) investigated the consequences of overqualification for postal workers relying on longitudinal data. They found indications of adaptation as perceived overqualification was not found to result in lower job satisfaction one year later. Also Verhaest and Omey (2009) found some evidence on limited adaptation, relying on panel data for young workers. Interestingly, they found a more pronounced effect of overeducation on job satisfaction once unobserved heterogeneity was accounted for[3].

For firms, job dissatisfaction may entail substantial costs if it results in more turnover and lower performance. There is cross-sectional evidence that overeducated workers have more quit intentions and engage more in on-the-job search than both types of adequately educated workers (e.g. Hersch, 1991; Tsang *et al.*, 1991). The studies that investigated the relationship between overeducation and performance are scarcer. While King and Hautaluoma (1987) found no statistical difference in self-rated performance between overqualified and adequately qualified workers, Fine and Nevo (2008) noted a positive difference in supervisor-rated job performance. Also studies relying on employer surveys by Athey and Hautaluoma (1994) and Maynard *et al.* (2009) concluded that overqualified workers outperform their adequately-qualified colleagues. Finally, relying on linked employer-employee panel data, Kampelmann and Rycx (2012) revealed a positive relationship between the average level of overeducation within firms and firm productivity. This suggests that the positive direct productivity effects resulting from the surplus of education more than outweigh the negative productivity effects resulting from job dissatisfaction.

To conclude, overeducation clearly has negative consequences for the individual worker. Yet, the negative effects on job satisfaction seem to diminish over time. While this might be explained by adaptation, another explanation may be that overeducated workers face a job quality improvement in terms of characteristics that are not investigated insofar. From the

employers' point of view, the picture is more nuanced. On the one hand, overeducated workers are paid higher wages and they are, at least early in their careers, less satisfied and more engaged in on-the-job search. On the other hand, they seem to perform better. Yet, hardly anything is known about what makes them to perform better. Moreover, there might be room for further productivity improvements to the extent that employers manage to minimise the adverse consequences of lower job satisfaction.

## 3. Job demands, control and overeducation: theory and hypotheses

The JDC-model (Karasek, 1979) offers an evident way to counter adverse consequences of overeducation. Karasek argues that a combination of job demands and control is essential for the development of strain and 'activity'. Psychological job demands refer to stressors such as the combination of high working pace and high time pressure. Control refers to the possibilities in deciding how to meet the job demands, and comprises two sub-dimensions: 'decision authority' and 'skill discretion'. The strain hypothesis states that the most adverse reactions of psychological strain are in the high strain job, which combines high job demands with low job control. High demands initiate a state of arousal leading to damaging, residual strain when it cannot be converted into an effective coping response, due to a lack of discretion. The learning hypothesis (Karasek, 1979) states that an increase in problem solving activity will occur in so-called active jobs, with high job demands and high job control. The JDC model has been extensively tested and confirmed in empirical research, both relying on cross-sectional data (de Lange *et al.*, 2003) and on panel data (Verhofstadt *et al.*, 2015).

We investigate the intermediate role of control and demands for the effect of overeducation on job satisfaction. Given the conceptual interconnection between overeducation and skill discretion, we only focus on the decision authority subdimension of control. Further, since also cognitive demands and job complexity (and thus overeducation) are conceptually interconnected, we focus on quantitative demands for the dimension 'psychological job demands'.

### *Effects of overeducation on demands and control*

Several authors have already suggested that the level of autonomy is related to overeducation. According to van der Meer and Wielers (1996) and Chatterji *et al.* (2003), employers favour overeducated workers because they require less supervision and monitoring. They delivered

indirect evidence on this hypothesis by showing that overeducation is more prevalent in organisations with monitoring difficulties, such as big firms. Also survey results indicate that recruiters associate overeducated workers with lower supervision requirements (Athey and Hautaluoma, 1994). The literature remains unclear about whether these lower supervision requirements either result from a direct overeducation effect ($\gamma>0$) or from an overall negative relationship between education or abilities and monitoring costs ($\alpha>0$). Whatever the reason, the result will be that overeducated workers get more autonomy than their adequately educated colleagues (cf. Equation (2): $\gamma+\alpha>0$, when *Y = control*; *Hypothesis 1*).

Whether overeducated workers also get more autonomy than their adequately educated former classmates partly depends on the relationship between autonomy and job complexity (cf. Equation (2)). Since higher level jobs are generally associated with more responsibilities and supervision tasks (Kristensen *et al.*, 2002; Vanroelen *et al.*, 2010), we expect this relationship to be positive ($\beta>0$). The direct overeducation effect and the job complexity effect thus may operate in opposite directions and, hence, it is not a-priori clear whether overeducation is beneficial or not from the individual's point of view. Although the results by McGuinness and Sloane (2011) suggest that both effects more or less balance out, other evidence is lacking.

The literature also delivers a few vantage points with respect to the impact of overeducation on quantitative demands. According to Bulmahn and Kräkel (2002), employers hire overeducated workers because they are able to quickly offer improvisational solutions in times of crises (e.g. a production process break down). This need for quick solutions will be higher when firms have to operate under strict deadlines. Further, a number of studies have found that educational outcomes are related to time management skills (Claessens *et al.*, 2007). Hence, higher educated individuals are likely to be, on average, more able to cope with workload. If so, it is rational for employers to assign more workload to higher educated individuals ($\alpha>0$). Both arguments imply that overeducated workers get more quantitative demands than their adequately educated colleagues ($\gamma+\alpha>0$ when *Y = demand*; *Hypothesis 2*).

The difference in quantitative demands between overeducated workers and their adequately educated former classmates both depends on the direct overeducation effect ($\gamma$) and the effect resulting from the fact that overeducated workers occupy jobs at lower job levels ($-\beta$). Several studies have found that higher skill-level positions are active jobs (Kristensen *et al.*, 2002; Vanroelen *et al.*, 2010), implying more control but also more demands ($\beta>0$). Also here, the direct overeducation effect and the job complexity effect may operate in opposite directions,

making it not a-priori clear whether overeducated workers get more or less quantitative demands than their adequately educated classmates.

*Interaction effects between overeducation and demands or control on job satisfaction*

The type of adequately educated workers to which overeducated ones are compared is also relevant when assessing possible interaction effects between overeducation and other variables. Consider that **X** consists of a set of variables **Z**, and interaction effects between the educational and mismatch variables and a moderating variable *M*. Then, we get the following extensions for equations (2) and (3):

(4) $Y = (\beta + \alpha)YREQ + (\gamma + \alpha)YOVER + (\delta - \alpha)YUNDER + (\beta_m + \alpha_m)YREQ * M + (\gamma_m + \alpha_m)YOVER * M + (\delta_m - \alpha_m)YUNDER * M + \boldsymbol{\vartheta}\mathbf{Z} + \varepsilon$

(5) $Y = (\alpha + \beta)YEDUC + (\gamma - \beta)YOVER + (\delta + \beta)YUNDER + (\alpha_m + \beta_m)YEDUC * M + (\gamma_m - \beta_m)YOVER * M + (\delta_m + \beta_m)YUNDER * M + \boldsymbol{\vartheta}\mathbf{Z} + \varepsilon$

The interaction effect between *YOVER* and *M* in equation (4), which compares workers occupying similar jobs, consists of the direct interaction effect ($\gamma_m$) and the interaction effect between years of education and *M* ($\alpha_m$). In equation (5), however, the interaction effect consists of the difference between the direct interaction effect ($\gamma_m$) and the interaction effect with years of required education ($\beta_m$). Hence, depending on the evaluated comparison, also different conclusions may be made regarding the interaction effect with *M*.

The possible moderating role of autonomy for the impact of overeducation on well-being has already been suggested by several authors. Ritti (1970) suggested that feelings of underemployment among engineers could be mitigated by giving them more control over work decisions . Put differently, giving more autonomy to formally overeducated workers might give them opportunities to craft their jobs and align them with their skills (cf. Wrzesniewski and Dutton, 2001). Similar arguments have been put forward by Khan and Morrow (1991) and Battu *et al.* (2000). Relying on cross-sectional data, a few studies also provided some indirect empirical evidence for these arguments. Weststar (2009) showed that technical and social control has a negative influence on perceived overqualification. Further, Erdogan and Bauer (2009) found that empowerment moderates the negative effects of perceived overqualification on job satisfaction and voluntary turnover. According to the authors, it is the sense of deprivation among overqualified workers that is alleviated by more autonomy.

Both the skills utilisation and the relative deprivation argument suggest that autonomy moderates the direct effect of overeducation on well-being ($\gamma_m$>0 when *Y = job satisfaction*). Since the literature delivers few vantage points regarding eventual supplementary effects related to years of (required) education, we expect a positive interaction effect between overeducation and autonomy on the basis of both specification (4) and (5) (*Hypotheses 3* and *4* respectively).

The possibility of an interaction effect between overeducation and demands has got less attention insofar. The JDC-model implicitly delivers a prediction regarding this relationship as skill discretion is defined as a subdimension of control. According to this model, skill discretion is a positive moderator for the negative effect of demands on job satisfaction. This process is directly related to discrepancies between attained and required education ($\gamma_m$<0), and not to overall levels of (required) education. Regarding the level of education, we expect a positive interaction effect with quantitative demands ($\alpha_m$>0) if higher educated individuals are indeed more able to cope with workload and time pressure (cf. supra). Hence, as the direct overeducation interaction effect and the education interaction effect operate in opposite directions, it is not a-priori clear whether the impact of quantitative demands on job satisfaction is higher or lower for overeducated workers in comparison to their adequately educated colleagues.

Further, following previous findings in the literature, we expect a positive interaction effect between quantitative demands and job complexity ($\beta_m$>0). Ritti (1970), for instance, noted the highest job satisfaction levels among individuals working in jobs with both high time and intellectual demands. Vanroelen *et al.* (2010) found that the health-damaging effects of job demands are stronger in low occupational status positions. As both the direct overeducation interaction effect and the opposite job level interaction effect are expected to be negative, we expect that quantitative demands have stronger adverse effects on job satisfaction for overeducated workers than for their adequately educated former classmates ($\gamma_m$-$\beta_m$<0; *Hypothesis 5*).

## 4. Data and methodology

Our analysis is based on the SONAR data regarding the early careers of Flemish young workers. These data originate from repeated surveys among two birth cohorts (born in 1976

and 1978 respectively), each consisting of about 3000 individuals. These respondents were selected through a representative multistage sampling and interviewed for the first time at age 23. Follow-up surveys were conducted at age 26, with response rates of about 70%. Trained interviewers performed the oral interviews at the interviewees' home address.

We investigate the situation at the start of the first job and the situation at the moment of the last interview (i.e. at age 26). The first job is defined as the first paid employment of at least one month. This job is observed for 5169 of the respondents. Given the longitudinal character of our study, we restrict the analysis to the 3694 individuals for which we also observe the situation at age 26. Exclusion of individuals with missing values further restricts the sample to 3032 persons. Finally, we exclude a small number of people who realized an increase in their level of education between the first job and age 26, resulting in a final sample of 2864 individuals.

*Estimation methods*

We estimate several model specifications in line with equations (2) and (3), with autonomy, quantitative demands and job satisfaction as dependent variables. To account for unobserved individual heterogeneity, random- or fixed-effects models may be estimated. Hausman tests revealed that fixed-effects models should be preferred to standard random-effects models in this study[4]. However, fixed-effects models cannot identify time-invariant effects. Hence, as *YEDUC* remains constant for our sample, we cannot estimate equation (3) on the basis of this method. Moreover, as *YREQ*, *YOVER* and *YUNDER* are a perfect linear combination of *YEDUC*, also equation (2) cannot be estimated on the basis of this method[5]. Therefore, we opt for estimating correlated random effects models, as proposed by Mundlak (1978). Our approach consist in additionally including individual-mean values of all time-varying covariates. This allows to include variables with no variation within individuals, while at the same time accounting for correlation between the random effects and the time-variant regressors[6]. Given the aforementioned perfect linear combination, we are able to include mean values of only two (*YOVER* and *YUNDER*) of the three education variables. By doing so, we account for unobserved differences between overeducated workers and their adequately educated former classmates, which is important when evaluating the impact of overeducation from the individual's perspective. However, we cannot account for unobserved differences across educational levels, which may contribute to differences in outcomes between overeducated workers and their adequately educated colleagues. Yet, to the extent

that individual heterogeneity that is unobservable to the researcher is also unobservable to the employer, this should not be problematic. After all, it doesn't matter for employers whether differences in behaviour between overeducated and their adequately educated colleagues result from differences in education or in unobservable factors[7].

*Variable measurement*

The measurement of *YEDUC* is based on the normal study length of the equivalent educational level. Five educational categories are distinguished: less than lower secondary (6 years of education), lower secondary (10 years), higher secondary (12 years), lower tertiary (15 years), and higher tertiary (16 years). For the measurement of *YREQ*, we rely on job analysis using the Standard Classification of Occupations of Statistics Netherlands (CBS). This detailed classification is based on five-digit codes and five job levels. The educational requirements of the job levels correspond to the five educational levels that were distinguished for the measurement of *YEDUC*. *YOVER* is computed by the difference between *YEDUC* and *YREQ* for overeducated workers and set to zero for other workers. A parallel measurement procedure is applied for *YUNDER*. The CBS measure has frequently been used in the literature (e.g. Groot and Maassen van den Brink, 2000b) and performed well in validation studies (e.g. van der Meer, 2006). A major advantage of using job analysis is avoiding the problem of reversed causality resulting from the influence of control on overeducation perceptions (cf. Weststar, 2009). While it may be argued that above all perceived overeducation influence job satisfaction, our results can be interpreted as being estimates of a reduced-form model, whereby objective overeducation influences perceived overeducation.

The measurement of demands and control are based on a list of items about different job characteristics[8]. Respondents rated these items on a 4-point scale, ranging from "completely disagree" to "completely agree". For job demands, we could only use one item, (whether one had to work at a great pace or under time pressure), related to the quantitative aspects of demands (*QDEMAND*). To measure control, we used an average of three items (*AUTON*): were the workers able to decide (a) what to do on a particular day, (b) how much work they had to perform that day and (c) how to perform the job. Their internal consistency, measured by Cronbach's alpha, is 0.863. To facilitate interpretation, we rescaled both *QDEMAND* and *AUTON* to a range from 0 to 1. For the measurement of job satisfaction at the career start, we rely on the question: "During the early phase of your first job, how satisfied were you with your job?" A similar question measures satisfaction at age 26. Each time, respondents had to

answer on a five-point Likert scale.

In the job satisfaction analysis, we account for three possible compensations for over-education (wages, autonomy and quantitative demands). Wages are measured by the natural logarithm of real hourly net wages (*LNWAGE*)[9]. To account for the heterogeneous composition of our sample, we include several control variables such as age, the percentage of employment (full time=100%) and dummy variables for firm size, sector of employment, public sector, gender, non-Belgian nationality and living together. Further, we control for some variables that are related to the structure of the data: dummies for the cohort (1976 or 1978), the type of observation (start first job or age of 26) and the type of job (first job or other job). Experience (*YEXP*) and its square are also included in every specification. Finally, in some specifications, we include interaction terms between the educational variables and experience to account for eventual changes in effects over time. Table 1 reports descriptive statistics on the main variables. In general, job quality improves over the career. At age 26, we observe less overeducation, higher wages, higher levels of reported autonomy and higher job satisfaction. Yet, individuals also report higher levels of demands and are more often undereducated for their job.

'Table 1'

## 5. Estimation results

We analyse the determinants of autonomy, quantitative demands and job satisfaction. In a first specification, we only account for main effects of the educational and mismatch variables. In specification two, we add interactions between these variables and experience. For job satisfaction, model 3 adds wages and JDC dimensions as possible compensation variables. Finally, model 4 also includes interactions between the JDC dimensions and the education and mismatch variables.

*Autonomy and quantitative demands*

Table 2 indicates that adequately educated workers get more autonomy when years of required education are higher. At the start of their career (*YEXP*=0), overeducated workers get less autonomy than their adequately educated former class mates (model with *YEDUC* included). Compared to their adequately educated colleagues, however, overeducated workers

get more autonomy (cf. *Hypothesis 1*). As overeducated workers get more experienced, the negative difference in autonomy compared to their adequately educated former classmates decreases. A simulation suggests that the gap between the overeducated and their former classmates is vanished after about 14 years (-0.0195/0.0014).

Also for quantitative demands, adequately educated workers experience more of it in jobs requiring more education. Overeducated workers have less quantitative demands than their adequately educated former class mates (model (1), with *YEDUC* included). Further, our results do not indicate that, at the start of the career (*YEXP=0*), the quantitative demands of overeducated workers differ from those of their adequately educated colleagues (model with *YREQ* included). However, we find evidence on a positive interaction effect between *YOVER* and *YEXP*. Hence, a positive gap in quantitative demands seems to emerge over time between overeducated workers and their adequately educated colleagues (cf. *Hypothesis 2*). Nevertheless, since there is also a positive interaction effect between *YREQ* and *YEXP*, their quantitative demands always remain lower than the demands they would have in a job that fits their education.

'Table 2'

*Job satisfaction*

Based on the specification without compensation variables (Model 1), we find that, at least during the early career, overeducated workers are less satisfied with their job in comparison to both types of adequately educated workers (Table 3). Further, we find these gaps to diminish with years of experience (Model 2). Simulations suggest that the job satisfaction gaps with both types of adequately educated workers are closed after about ten to eleven years.

'Table 3'

Model 3 includes wages and the JDC dimensions as compensation mechanisms. The results on the JDC dimensions confirm the strain hypothesis of the JDC model; a positive effect of autonomy and a negative effect of time pressure on job satisfaction. Also the interaction effect is statistically significant. The absolute value of the overeducation coefficient decreases with about one fifth in value in the model that controls for *YEDUC* (from -0.112 to -0.092). This is due to the fact that, at the career start, overeducated workers earn less[10] and have less autonomy than their adequately educated former classmates. In the specification that controls

for *YREQ*, the coefficient increases with about one fourth (from -0.121 to -0.155). This results from higher wages and higher levels of autonomy in comparison to adequately educated colleagues at the start of their careers. Also the positive interaction effects between over-education and years of experience drop slightly since overeducated workers get more autonomy as their experience grows. Nevertheless, these interaction effects remain largely statistically significant.

Model 4 investigates possible interaction effects between the education variables and autonomy and quantitative demands. In line with *Hypothesis 3 and 4*, autonomy positively moderates the job satisfaction difference between overeducated and both types of adequately educated workers[11]. Opposed to *Hypothesis 5*, we have no indications that quantitative demands have stronger adverse effects on job satisfaction for overeducated workers than for adequately educated workers with a similar educational background. Finally, we find a positive interaction effect between overeducation and quantitative demands in the model that controls for *YREQ*.

Given that the impact of autonomy and quantitative demands on job satisfaction depends on the match status of individuals, we provide some effect size estimates for alternative types of workers. We computed the effect size of changing from a passive job (i.e. a combination of low demands and low control) to an active job (i.e. combination of high demands and high control)[12] for three types of workers: overeducated workers with a lower tertiary degree (*YEDUC*=15) and working in jobs that require a higher secondary degree (*YREQ*=12), and for their adequately educated counterparts. Activating passive jobs has by far the largest job satisfaction impact for overeducated workers: their job satisfaction increases by 0.988 compared to an increase of 0.335 for their adequately educated former classmates and an increase of 0.645 for their adequately educated colleagues. Decomposition of this effect shows that this is explained both by a higher impact of autonomy and a less negative impact of quantitative demands.

## 6. Discussion and conclusions

Our results deliver several insights into the relationship between overeducation and job satisfaction, and the intermediate role of autonomy and quantitative demands. First, we found that overeducated workers have more autonomy than their adequately educated colleagues but

less than their adequately educated former classmates. This resembles the findings regarding overeducation and earnings (see Hartog, 2000). We also found that being employed in a job for which one is overeducated is associated with less perceived quantitative demands. Few other studies have already found that overeducation may also have positive consequences if assessed from the individual's point of view. On the contrary, apart from lower earnings and job satisfaction, also other negative consequences have been detected such as lower training participation (e.g. Hersch, 1991). Compared to their adequately educated colleagues however, overeducated workers seem to perceive higher levels of quantitative demands once they get more experienced.

The finding that autonomy is a positive moderator for the impact of overeducation on job satisfaction is in line with previous conclusions of Erdogan and Bauer (2009) and Weststar (2009). Our contribution is that we relied on panel data, allowing to account for unobserved heterogeneity, and that we measured overeducation in a more objective way, thus avoiding the problem of reversed causality. Further, we showed that this moderation effect exists both from the individual's and the firm's perspective. This, in combination with the finding that there was no interaction effect between autonomy and years of (required) education suggests that autonomy moderates the pure mismatch effect of overeducation. Potential explanations are that autonomy provides formally overeducated workers with more opportunities to utilize their skills (Ritti, 1970) or that autonomy alleviates the sense of deprivation among overeducated workers (Erdogan and Bauer, 2009). Finally, we found that quantitative demands have less adverse consequences for higher educated workers, whatever the quality of their match. This is in line with our supposition that higher educated and higher skilled workers are more able to cope with workload.

*Implications*

Our results provide some answers on the questions raised in the introduction. With respect to the question why labour market entrants accept positions for which they are overeducated, we find no indications that there is some compensation mechanism at the start of the career. Inexperienced overeducated workers seem to be compensated with less quantitative demands, but this effect is largely overruled by the lower level of autonomy that is associated with overeducation. Also for more experienced young workers, we find no indications that there is compensation. While autonomy increases faster over the career in the case of overeducation than in the case of adequate employment, our results suggest that it takes more than ten years

to close the initial autonomy gap. Hence, while this growth in autonomy may decrease their quit intentions, and thus may explain why young workers remain overeducated, it cannot be the full story. It thus seems that overeducation is mainly involuntary during the first years on the labour market, probably because of labour market rigidities. An additional mechanism that may explain why overeducation persists is adaptation. While the job satisfaction effect of overeducation remains negative, it clearly diminishes with experience, even if we filter out the effect of increasing levels of autonomy.

Our results also suggest some answers on the question why employers are prepared to hire overeducated individuals. While their lower job satisfaction might have adverse productivity consequences, there might also be some advantages. First, we found that these workers, which are more highly educated, experience less adverse effects from quantitative demands. Further, the finding that overeducated workers get more autonomy than their colleagues is consistent with the proposition of van der Meer and Wielers (1996) and Chatterji *et al.* (2003) that these workers require less monitoring and supervision. These advantages may compensate or even overrule the negative productivity effects resulting from their lower job satisfaction in comparison to adequately educated workers. Finally, the analysis also provides clear guidelines for employers to avoid any remaining negative consequences for productivity. A first best solution would of course be to provide adequate positions. However, as our results showed, activating their jobs seems to be a good second best.

*Directions for further research*

Several avenues for further research can be identified. First, while our results suggest that the autonomy and job satisfaction effect of overeducation decreases with experience, it remains unclear whether these effects completely disappear. Hence, it might be interesting to look beyond the first ten years on the labour market. Second, we only focussed on wages, demands and control as potential compensation mechanisms. However, many other factors, inside or outside the job, might work as compensators for overeducation (cf. McGuinness and Sloane, 2011). Third, also the role of more underlying mechanisms in this context, such as job crafting, deserves more attention. This may not only add to our understanding about how control moderates the impact of overeducation on worker well-being, it may also add to our knowledge about the extent to which organizations and labour markets are able to absorb initial surpluses of skills. Finally, also studies relying on data for other countries and regions would be welcome.

Notes

[1] For extended discussions on the reasons why overeducation may emerge, see McGuinness (2006).

[2] Overeducated individuals may, for instance, be less able if subsidization incentivizes less able people to invest more in educational signals than socially optimal.

[3] A potential explanation may be that overeducated workers have on average lower aspirations, resulting in on average higher baseline job satisfaction levels.

[4] The null hypothesis that the coefficients are not systematically different was always rejected ($p<0.01$).

[5] One option may be to include those who changed educational levels in our sample. However, this group is very small and can be considered to be highly selective.

[6] The estimated coefficients of the time-varying variables and their standard errors are equivalent to those on the basis of a first-differencing or fixed-effects estimation approach since we only have two observation periods.

[7] We also estimated standard random-effects models. While the sizes of the coefficients and their statistical significance were sometimes different, overall conclusions were largely similar (results available upon request).

[8] All survey questions and measurements regarding the first time period apply to the early phase of the first job.

[9] While exact wages were reported for most individuals, we have information in intervals for one survey (cohort 76 at age 23) and for those who refused to report exact wages. In that case, we rely on interval midpoints. Observation with extreme values, defined as more than two standard deviations above or below the mean *LNWAGE*, are excluded.

[10] Estimates on the earnings equation, relying on the data used in this paper, confirmed the findings in the literature (results available upon request).

[11] Although the main effect of *AUTON* is statistically insignificant in model 4, this does not imply that autonomy has no effect for other than overeducated workers since all workers have at least 6 years of education. Additional F tests reveal that the impact of autonomy is statistically significant ($p<0.01$) in the case of adequate employment for all but the least-educated in our sample (*YEDUC*=6).

[12] Simulations are for minimum or maximum levels of autonomy and quantitative demands (i.e. values 0 or 1).

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**Table 1**: Descriptive statistics

| | Start First job | | Job at age 26 | |
|---|---|---|---|---|
| *YEDUC* | 13.388 | (2.239) | 13.388 | (2.239) |
| *YREQ* | 11.895 | (2.965) | 12.470 | (2.705) |
| *YOVER* | 1.679 | (2.100) | 1.186 | (1.738) |
| *YUNDER* | 0.185 | (0.788) | 0.268 | (0.927) |
| *YEXP* | 0.000 | (0.000) | 4.643 | (1.963) |
| *LNWAGE* | 1.950 | (0.212) | 2.057 | (0.191) |
| *AUTON* | 0.421 | (0.288) | 0.541 | (0.273) |
| *QDEMAND* | 0.556 | (0.317) | 0.624 | (0.303) |
| *JOB SATISFACTION* | 3.840 | (1.045) | 4.093 | (0.769) |

DATA source: SONAR, own calculations; Number of individuals =2864.

**Table 2**: Autonomy and Quantitative Demands – Random effects linear regression coefficients and standard errors (Mundlak correction)

| | Autonomy | | | | | | | | Quanititative Demands | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | (1) | | | | (2) | | | | (1) | | | | (2) | | | |
| Specification | *YEDUC* included | | | | *YREQ* included | | | | *YEDUC* included | | | | *YREQ* included | | | |
| *YEDUC* | 0.039 | *** | (.003) | | | | | | 0.046 | *** | (.006) | | | | | |
| *YREQ* | | | | | 0.039 | *** | (.003) | | | | | | 0.046 | *** | (.007) | |
| *YOVER* | -0.017 | *** | (.003) | | 0.022 | *** | (.004) | | -0.020 | *** | (.003) | | 0.026 | *** | (.007) | |
| *YUNDER* | 0.024 | *** | (.007) | | -0.015 | * | (.008) | | 0.028 | *** | (.009) | | -0.018 | | (.011) | |
| *YEDUC*YEXP* | | | | | | | | | 0.000 | | (.001) | | | | | |
| *YREQ*YEXP* | | | | | | | | | | | | | 0.000 | | (.001) | |
| *YOVER*YEXP* | | | | | | | | | 0.001 | ** | (.001) | | 0.001 | | (.001) | |
| *YUNDER*YEXP* | | | | | | | | | -0.001 | | (.002) | | -0.001 | | (.001) | |
| Overall $R^2$ | 0.222 | | | | | | | | 0.223 | | | | | | | |

| | Quanititative Demands | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | (1) | | | | (2) | | | |
| Specification | *YEDUC* included | | | | *YREQ* included | | | |
| *YEDUC* | 0.015 | *** | (.003) | | | | | |
| *YREQ* | | | | | 0.015 | *** | (.003) | |
| *YOVER* | -0.009 | ** | (.004) | | 0.005 | | (.005) | |
| *YUNDER* | 0.006 | | (.009) | | -0.009 | | (.010) | |
| *YEDUC*YEXP* | | | | | | | | |
| *YREQ*YEXP* | | | | | | | | |
| *YOVER*YEXP* | | | | | | | | |
| *YUNDER*YEXP* | | | | | | | | |
| Overall $R^2$ | 0.068 | | | | | | | |

| | Quanititative Demands | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | (2) | | | | | | | |
| Specification | *YEDUC* included | | | | *YREQ* included | | | |
| *YEDUC* | 0.021 | *** | (.008) | | | | | |
| *YREQ* | | | | | 0.021 | *** | (.008) | |
| *YOVER* | -0.007 | * | (.004) | | 0.014 | | (.009) | |
| *YUNDER* | -0.015 | | (.011) | | -0.036 | *** | (.014) | |
| *YEDUC*YEXP* | 0.004 | *** | (.001) | | | | | |
| *YREQ*YEXP* | | | | | 0.004 | *** | (.001) | |
| *YOVER*YEXP* | -0.001 | | (.001) | | 0.003 | ** | (.001) | |
| *YUNDER*YEXP* | 0.006 | *** | (.002) | | 0.002 | | (.002) | |
| Overall $R^2$ | 0.072 | | | | | | | |

Variables: *YEDUC* = years of education; *YREQ* = years of required education; *YOVER* = years of overeducation; *YUNDER* = years of undereducation; *YEXP* = years of experience; standard errors in parentheses; *: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$; Also included but not reported: intercept, experience, experience squared, percentage of employment, age, dummies for gender (1), non-Belgian nationality (1), cohort (1), living together (1), firm size (4), sector of employment (12), public sector (1), observation at age 26 (1), job change (1), and Mundlak correction terms; Number of observations = 5728; number of individuals =2864.

**Table 3**: Job satisfaction - Random effects linear regression coefficients and standard errors (Mundlak correction)

| Model Specification | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| | *YEDUC* included | *YREQ* included | *YEDUC* included | *YREQ* included | *YEDUC* included | *YREQ* included | *YEDUC* included | *YREQ* included |
| *YEDUC* | 0.022 ** (.010) | | -0.009 (.021) | | -0.063 *** (.021) | | -0.109 *** (.031) | |
| *YREQ* | | 0.022 ** (.010) | | -0.009 (.021) | | -0.063 *** (.021) | | -0.109 *** (.031) |
| *YOVER* | -0.092 *** (.011) | -0.070 *** (.015) | -0.112 *** (.012) | -0.121 *** (.024) | -0.092 *** (.012) | -0.155 *** (.024) | -0.129 *** (.022) | -0.238 *** (.038) |
| *YUNDER* | 0.037 (.027) | 0.015 (.029) | 0.024 (.034) | 0.033 (.040) | -0.011 (.032) | 0.052 (.039) | -0.005 (.061) | 0.103 (.069) |
| *YEDUC*YEXP* | | | 0.000 (.003) | | -0.000 (.003) | | -0.001 (.003) | |
| *YREQ*YEXP* | | | | 0.000 (.003) | | -0.000 (.003) | | -0.001 (.003) |
| *YOVER*YEXP* | | | 0.011 *** (.003) | 0.011 *** (.004) | 0.010 *** (.003) | 0.009 ** (.004) | 0.007 *** (.003) | 0.006 (.004) |
| *YUNDER*YEXP* | | | 0.006 (.006) | 0.006 (.005) | 0.007 (.005) | 0.007 (.005) | 0.007 (.006) | 0.009 * (.005) |
| *LNWAGE* | | | | | 0.372 *** (.094) | 0.372 *** (.094) | 0.380 *** (.094) | 0.380 *** (.094) |
| *AUTON* | | | | | 0.717 *** (.113) | 0.717 *** (.113) | 0.030 (.437) | 0.030 (.437) |
| *QDEMAND* | | | | | -0.420 *** (.090) | -0.420 *** (.090) | -1.206 *** (.333) | -1.206 *** (.333) |
| *AUTON*QDEMAND* | | | | | 0.331 ** (.158) | 0.331 ** (.158) | 0.272 (.169) | 0.272 (.169) |
| *YEDUC*AUTON* | | | | | | | 0.042 (.032) | |
| *YREQ*AUTON* | | | | | | | | 0.042 (.032) |
| *YOVER*AUTON* | | | | | | | 0.102 *** (.031) | 0.144 *** (.044) |
| *YUNDER*AUTON* | | | | | | | -0.009 (.074) | -0.051 (.069) |
| *YEDUC*QDEMAND* | | | | | | | 0.061 ** (.026) | |
| *YREQ*QDEMAND* | | | | | | | | 0.061 ** (.026) |
| *YOVER*QDEMAND* | | | | | | | 0.012 (.026) | 0.074 ** (.035) |
| *YUNDER*QDEMAND* | | | | | | | 0.001 (.065) | -0.060 (.060) |
| Overall $R^2$ | 0.128 | | 0.133 | | 0.209 | | 0.218 | |

Variables: *YEDUC* = years of education; *YREQ* = years of required education; *YOVER* = years of overeducation; *YUNDER* = years of undereducation; *YEXP* = years of experience.*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$; standard errors in parentheses; also included but not reported: see table 2; Number of observations = 5728; number of individuals =2864.